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Abstract

Most enterprises in the Russian Federation are not prepared to report to the Russian Federal Nuclear Material Control and Accounting Information System (FIS) by the full function reporting method. The full function reporting method requires reporting inventory listings on a schedule based on nuclear material category, submission of individual inventory change reports, and reconciliation and closeout at the end of each reporting period. Most Russian enterprises do not have automated systems and do not have the resources to develop and implement such systems. Over the last two years, MinAtom put the regulations and national level nuclear material control and accounting (MC&A) software in place to require all enterprises in the Russian Federation to report summarized inventory listings to the FIS in January 2002. Enterprises do not need automated systems to comply with summarized reporting requirements. Along with the approximately 25% of the total Category 1 Material Balance Areas (MBAs) using full function reporting, the addition of this complete summarized inventory makes the FIS a more valuable tool for MinAtom management. The FIS is now poised to complete the work by improving the integrity and reliability of the data through increasing the number of enterprises and MBAs using full function reporting.

There are obstacles and issues that must be dealt with along the way to achieving the final goal of every MBA sending inventory and inventory change reports using the full function reporting method. Summarized reporting is a major step toward this final goal. Currently all MBAs using full function reporting are doing so under a U.S. contract. FIS management recognized full function reporting could not be implemented in the near-term and prepared a plan with immediate, intermediate, and long-term FIS tasks. To address the major obstacles and optimize implementation, two paths need to be followed in parallel: developing the regulatory basis and overcoming obstacles for enterprises/MBAs reporting by the full function method. This paper will discuss what can be done to support this endeavor, what is within the capability of the Russian government to support and what U.S. assistance will be needed.

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I. Minatom of Russia: the Organization Responsible for the Development and Operation of the FIS

The development of the Russian Federal Information System for Nuclear Material Control and Accounting (FIS) began in 1996 pursuant to the "Conceptual Design of the State System for Nuclear Material Accounting and Control," which was adopted by order of the Government of the Russian Federation on 14 October 1996.

The U.S. Department of Energy has actively cooperated and provided assistance since the inception of this project. During the period 1996-1998, the Federal Nuclear and Radiation Safety Authority of Russia (Gosatomnadzor of Russia) was the Russian organization responsible for the development of the system. The project was transferred to Minatom of Russia in 1998 after the Russian Government approved and issued the document "Organizational Rules for the State System for Nuclear Material Accounting and Control." The main developer of the system was and remains Atominform. In 1999, the organization of the project was restructured to facilitate the development of the system and coordinate the activities of all participants. The Minatom Department of Economics and Planning was named as the client and the Minatom Situation and Crisis Center was designated as the project management organization.

II. Major Stages in the Development of the FIS

The development of the FIS may be divided into two stages: the period from 1996-1999 and the current period that began in 2000.

First Stage (1996 – 1999)

The major tasks facing the developers of the FIS included: developing a conceptual design of the system; selecting the appropriate technical solutions; developing methods to communicate with and link to the enterprises; and working out the details of collaboration and cooperation with U.S. partners.

We completed the following objectives during the first stage:

- Developed and adopted requirements for the FIS Technical Description;
- Created and prepared a prototype production system for the Information Analysis Center;
- Put together a qualified team of system developers;
- Developed and refined procedures for the collaboration of the Russian and U.S. teams.

During this stage in the development of the FIS, there were no regulations specifying the reporting procedure for the State System for Nuclear Material Accounting and Control. A decision was made to contract with several enterprises that would report material balance area (MBA) level data during the development and testing phases of the FIS. Accordingly:

- A procedure was established for exchanging information with MBAs from five Russian enterprises;
- The scope of the necessary reporting data was determined and procedures and forms were developed for submitting this data via exchange files to the FIS;
- Technology was designed and implemented to correct information, reconcile system data and close out reporting periods;
- A team of operators was established at the Information Analysis Center;
- Procedures were developed and implemented to process and summarize the information received by the system and produce output reports.

Second Stage (since 2000)

This stage may be viewed as the implementation phase of the production system. The major tasks include: completing the design and implementation of the system; developing and implementing FIS technical and organizational documentation; developing and implementing report forms; refining procedures for exchanging information with Russian enterprises that handle nuclear material; and continuing collaboration with U.S. partners.

III. The Full Function and Summarized Reporting Methods

In the first stage, the FIS was developed to receive batch-level inventory listings (ILs) and individual inventory change reports (ICRs) with a reporting period for reconciliation and closeout based on the category of the nuclear material in the MBA (the full function reporting method). An analysis conducted at the end of 1999 and the beginning of 2000 showed that the full function reporting method adopted for the first stage of the FIS could not be implemented system-wide in the near future to collect information from all the Russian organizations that use nuclear material.

Hundreds of material balance areas at Russian enterprises handle millions of items. To implement full function reporting at the MBA level, practically every nuclear material enterprise would need to be equipped with an appropriate computer system, which is simply not possible under current conditions in Russia. Obtaining U.S. support to upgrade all Russian Federation enterprises with automated inventory systems is not possible because of the U.S. requirement that support may only be provided to enterprises with category 1 nuclear material.

Moreover, enterprises reporting under the complete method would require advanced technical and metrological equipment, as well as an appropriately trained and qualified staff.

Federal regulations issued in 2000-2001 (the "Regulation on State Nuclear Material Control and Accounting" and "Basic Nuclear Material Control and Accounting Rules") stipulate that organizations handling nuclear material must submit inventory listings and inventory change reports to Minatom of Russia that are summarized at the operating organization level. The reporting method established by these documents (the summarized reporting method) requires each enterprise to submit annual summarized inventory listings (SILs) and quarterly summarized inventory change reports (SICRs) to the FIS.

The result of having regulations requiring summarized reporting means that the FIS requirements can currently cover all Russian Federation enterprises and allows the FIS to collect and process summarized reports based on its current capabilities. At the same time, we can continue our efforts to maximize the implementation of the full function reporting method.

It should be kept in mind that there are some key differences between the full function and summarized reporting methods. The full function reporting method establishes a reporting period (month, quarter, half-year or year) for each enterprise or MBA based on its material category, with ILs sent to the FIS at the end of the reporting period and individual ICRs sent during the period in which the change occurred. After the end of each reporting period, reconciliation between the FIS and the enterprise or MBA is performed with a scheduled closeout after which no more reports for that reporting period may be entered into the FIS. The level of detail with full function reporting is at the batch level and the FIS can operate with enterprise level and MBA level reporting. Since the summarized reporting method requires only quarterly submission of summarized inventory changes and annual submission of SILs, reconciliation and closeout can only be performed on an annual basis. The level of detail for summarized reporting is summarized batches at the enterprise level.

IV. 2002: Initial Operation of the First Production Version of the FIS

During 2001, Minatom of Russia developed and implemented the report forms, including a procedure for their completion and submission. Beginning in January 2002, all Russian enterprises handling nuclear material will use summarized forms (SIL and SICR) when submitting information to Minatom of Russia.

It should be noted that the enterprises and FIS operators have encountered numerous difficulties during the mass transition to the new report forms, which were designed to facilitate computer processing (reporting was previously implemented via a simple "analog" method).

Future plans include the development and implementation of other report forms specified by the Regulation: a nuclear material movement report for transfers between organizations; an import/export report; a special report on nuclear material control and accounting anomalies, etc.

V. FIS Development Program

The reporting method stipulated by the Regulation allows us to resolve a significant number of the tasks designated for the FIS. Certain of these tasks require more detailed information, however, which is why the FIS project has been expanded to incorporate the use of both the "full function" and "summarized" reporting methods based on a standard system of classifiers, reference tables and data structures.

Minatom of Russia developed the FIS Development Program, which establishes specific stages for the implementation of the FIS production system, including immediate, intermediate and long-term measures.

The main tasks in the immediate future (2002-2003) are to complete the basic set of FIS functions stipulated by the "Basic Nuclear Material Control and Accounting Rules" (OPUK) and the "Regulation on State Nuclear Material Control and Accounting"; implement all regulations pertaining to system report forms; and finish the construction of the Information Analysis Center. During this stage, we anticipate that the majority of enterprises will submit information to the FIS in hard copy. The most important task at this time is to complete the essential components of the FIS, from the preparation of enterprise reports to the distribution of FIS data to system users, including the generation of the State Register of Nuclear Material.

Establishment of the legal basis for electronic submission of information is critical to the success of the FIS.

The objectives of the intermediate stage (2004-2005) are:

- To develop an infrastructure for the transition to electronic report forms (i.e., implementing regulations for electronic reporting and providing the means for more enterprises to report electronically);
- To expand the functions of the FIS based on operational experience during the first production phase;
- To support the operation of the FIS with respect to receiving exchange file reports and exchanging information with the information systems of federal executive branch agencies.

Future long-term tasks specified in the FIS Development Program (2006-2008) include the possible transition to MBA reporting within the scope of the stated tasks, provided that appropriate regulatory, economic and technical support is available.

The FIS Development Program has been developed by Minatom of Russia. Some of the identified tasks would be funded solely by the Russian Federation. The U.S. would determine which tasks to support based on its own guidelines and priorities.

VI. Accelerating the FIS Development Process

As previously noted, future plans for the FIS include the transition to the full function reporting method. Our current task, however, is to adopt measures to expedite the implementation of the summarized reporting method and improve the quality of the information submitted to the FIS. The processing results for the initial summarized reports submitted to the FIS showed that practically all of the reports contained errors. Since the regulations stipulate that these reports must be submitted in hard copy, FIS personnel must spend a large amount of time converting report data from paper media to the electronic format used by the FIS. Many enterprises had difficulty correctly converting their detailed inventory data into the summarized format.

In light of these results, it is clear that we must take the following steps in the near future:

- Issue federal regulations that establishes the procedure for submitting reports at the MBA level in accordance with the category of nuclear material;
- Develop and adopt corresponding report forms;
- Revise and improve the coding system;
- Provide the enterprises with an appropriate tool for preparing reports electronically and in hard copy (the automated report workstation) that satisfies FIS requirements;
- Expand the functions of the FIS;
- Increase the number of Information Analysis Center analysts and service personnel and improve the quality of their work;
- Provide regular training for MBA employees responsible for MC&A activities;
- Develop and implement the official procedure for transferring classified information on electronic media, including the development of a special procedure for exchanging information over communications lines.

One of the most important tasks is to provide the necessary equipment and software for nuclear material control and accounting to all Russian Federation enterprises that use nuclear material and to facilitate reporting by the full function method.

The stages stipulated in the FIS Development Program should not be regarded as a strict, sequential plan. One way of accelerating the development of the FIS is to complete the tasks of the different stages in parallel, i.e., activities scheduled for the intermediate or long-term stages could be completed before the conclusion of the previous stage. An example is the continuation of activities associated with the implementation of the full function reporting method. We have already begun the development of organizational and technical documentation for submitting SILs and SICRs in the form of exchange files (a task designated for the second stage of development).

The problem in introducing the full function reporting method is the absence of a regulatory environment requiring the enterprises to submit detailed reports to the FIS (ILs and individual ICRs). We are currently examining the possibility of issuing a Minatom of Russia order that authorizes enterprises with the necessary technical resources to begin officially reporting their data via the full function method.

The regulations should be flexible in order to allow the enterprises to report their data in either the summarized or detailed format. This will also facilitate the transition to full function reporting.

A number of activities are being planned or conducted in this area:

1. We are implementing a contract that stipulates the redevelopment and improvement of the coding system required for reporting at the MBA level.

2. There are plans for the development of regulations on electronic report forms that allow reporting of individual batches rather than the summarized batches (specified in SILs and SICRs) as the basis for reporting on enterprise nuclear material.

3. We are providing and planning training resources for MBA personnel that prepare enterprise reports: five "schools" were conducted at the end of 2000 and the beginning of 2001, and we are currently planning special courses to be taught on a regular basis in Moscow.

An example of our ability to overcome the problems that sometimes arise during the course of Russian and U.S. collaboration on the State System for Nuclear Material Accounting and Control is the solution for protecting the transfer of confidential information over public networks through encryption. The U.S. provided 100 computers for all the enterprises included in the FIS and the Russia team developed the necessary software.

The successful operation of the FIS is the main argument in favor of the accelerated transition to the full function reporting method, which will provide the FIS with more detailed information and, consequently, a higher degree of nuclear material security and oversight capability.

VII. Problems that Impede the Accelerated Development of the FIS

There are specific issues delaying the expedited development of a full function FIS with data based on measurements and physical inventory that are beyond the scope of the working group responsible for this project.

One of the most significant features of the FIS is that it is tightly and continuously integrated with other elements of the State System of Nuclear Material Accounting and Control. To have a truly mature FIS, appropriate hardware, metrological support, and sufficiently trained and qualified personnel who implement nuclear material accounting and prepare reports for the FIS are needed.

One of the key issues affecting the transition to a more advanced and successful FIS (exchanging information electronically and utilizing the full function reporting method) is the development of automated enterprise information systems. As we know, several enterprises are creating information systems with the assistance of U.S. specialists. Logically, one would expect that these activities should end with the connection of the enterprise information system to the FIS. Now that the FIS is operational and receiving and processing information from all the enterprises handling nuclear material, we should review the requirements for these joint projects. We believe the coordination of all the projects related to the creation of enterprise information system for nuclear material control and accounting is key to the success of the Russian Federation State System of Nuclear Material Accounting and Control.

In our opinion, the integration of these projects, which are being implemented with the assistance of U.S. laboratories, could constitute a major advance in the creation of a modern nuclear material control and accounting system for the Russian Federation.

Additionally, we should recognize that the ultimate goal of having a measurements-based inventory in the FIS depends not only on the status of the FIS and the enterprise information systems, but on the use of enterprise measurements of nuclear material to obtain the information

reported to the FIS. Furthermore, as required by regulations, appropriate physical inventory procedures must be implemented at the enterprises. Unfortunately, this task is beyond the purview of the FIS development project.

Accordingly, the acceleration of the development of the Federal Information System for Nuclear Material Control and Accounting depends directly on the results of the collaborative efforts of the U.S. and Russia pursuant to the creation of the State System for Nuclear Material Accounting and Control and all of its components.